Rising to the Innovation Challenge

G. Wayne Clough, President
Georgia Institute of Technology

Metro Atlanta Chamber of Commerce
June 17, 2004

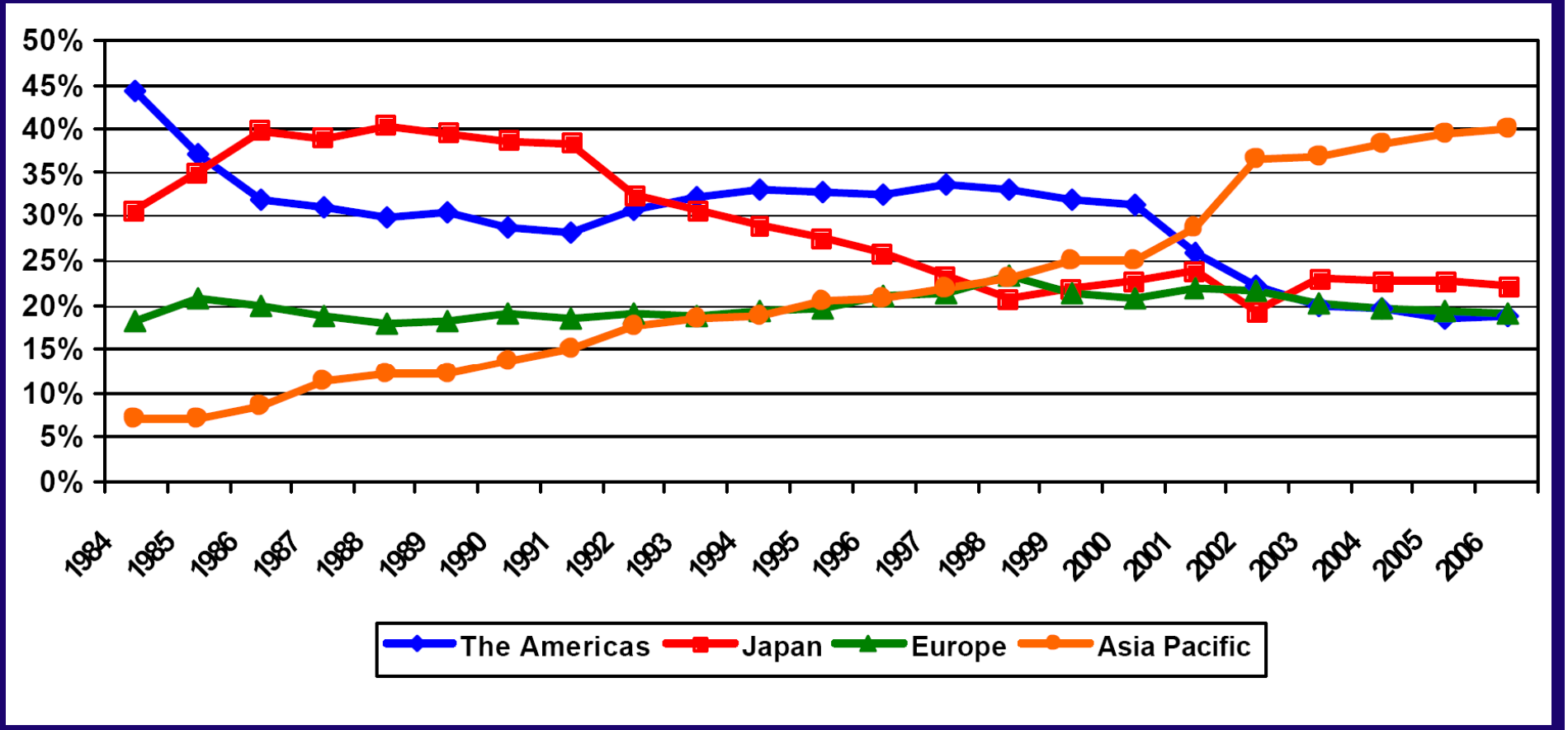
The challenge

"The U.S. is not graduating the volume of scientists and engineers, we do not have a lock on the infrastructure, we do not have a lock on the new ideas, and we are either flat-lining, or in real dollars cutting back, our investments in physical science and engineering. The only crisis the U.S. thinks it has today is the war on terrorism. It's not."

Craig Barrett
CEO, Intel

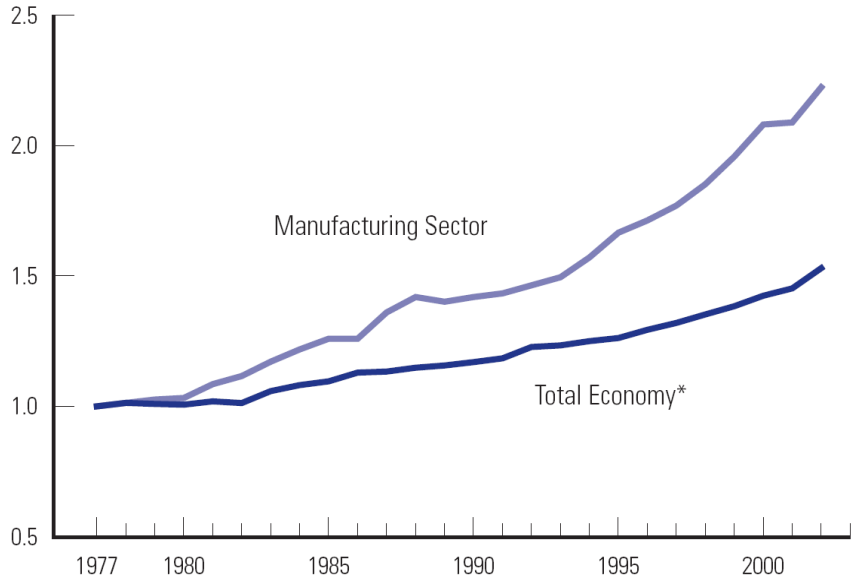
Shifting semiconductor market

Percentage of consumption by region



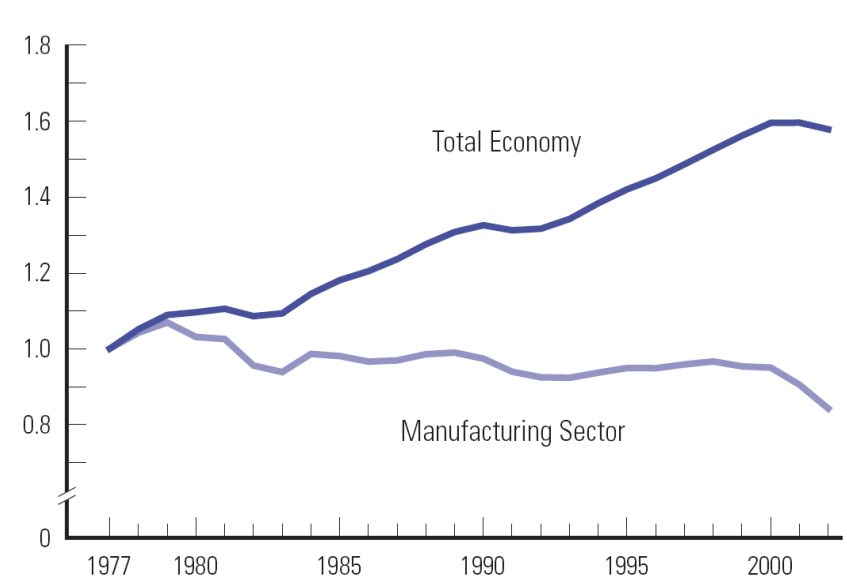
Improving productivity shrinks the manufacturing workforce

U.S. Productivity (1977-2002)



* Excludes government and agricultural sectors.
Index: 1977 = 1.0
Source: U.S. Department of Labor, Bureau of Labor Statistics.

U.S. Employment Growth (1977-2002)



Index: 1977 = 1.0
Source: U.S. Department of Labor, Bureau of Labor Statistics.

NOTE: Manufacturing's contribution to real private output growth has remained roughly the same since 1977.

Why companies move offshore

- ⇨Lower labor costs
- ⇨Improving workforce skills; growing investment in R&D and higher ed
- ⇨Proximity to emerging markets
- ⇨Increasing replication of U.S. innovation successes overseas
- ⇨Concerted efforts by foreign governments to offer incentives

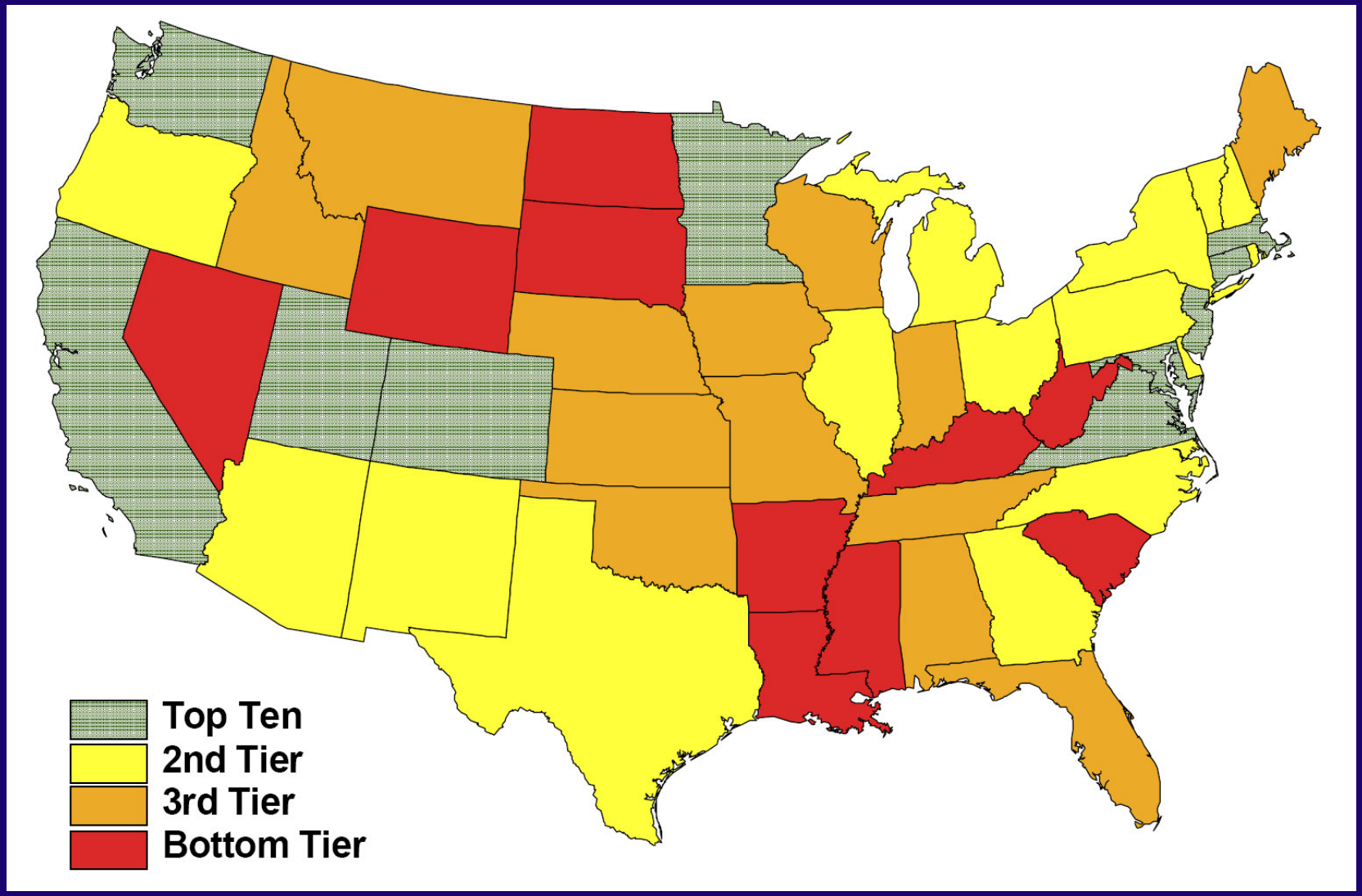
The opportunity

"Science, technology, and knowledge-driven innovation are critical to job and wealth creation in these new dimensions of economic reality. The degree to which a state's knowledge assets are harnessed and converted into successful innovations, products and services determines its economic future."

Milken Institute's 2004 State Technology and Science Index

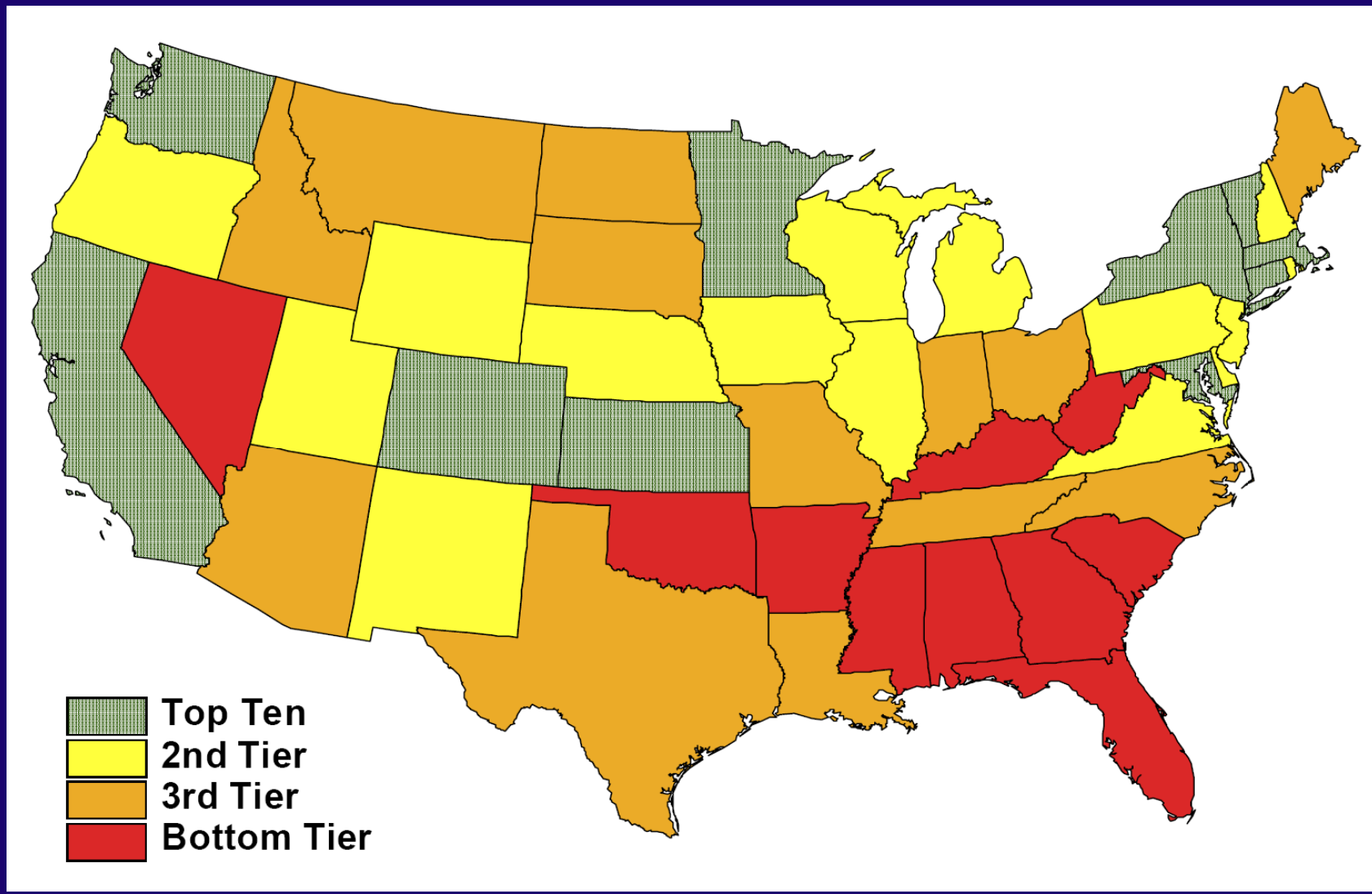
Milken Institute 2004

Technology & Science Index



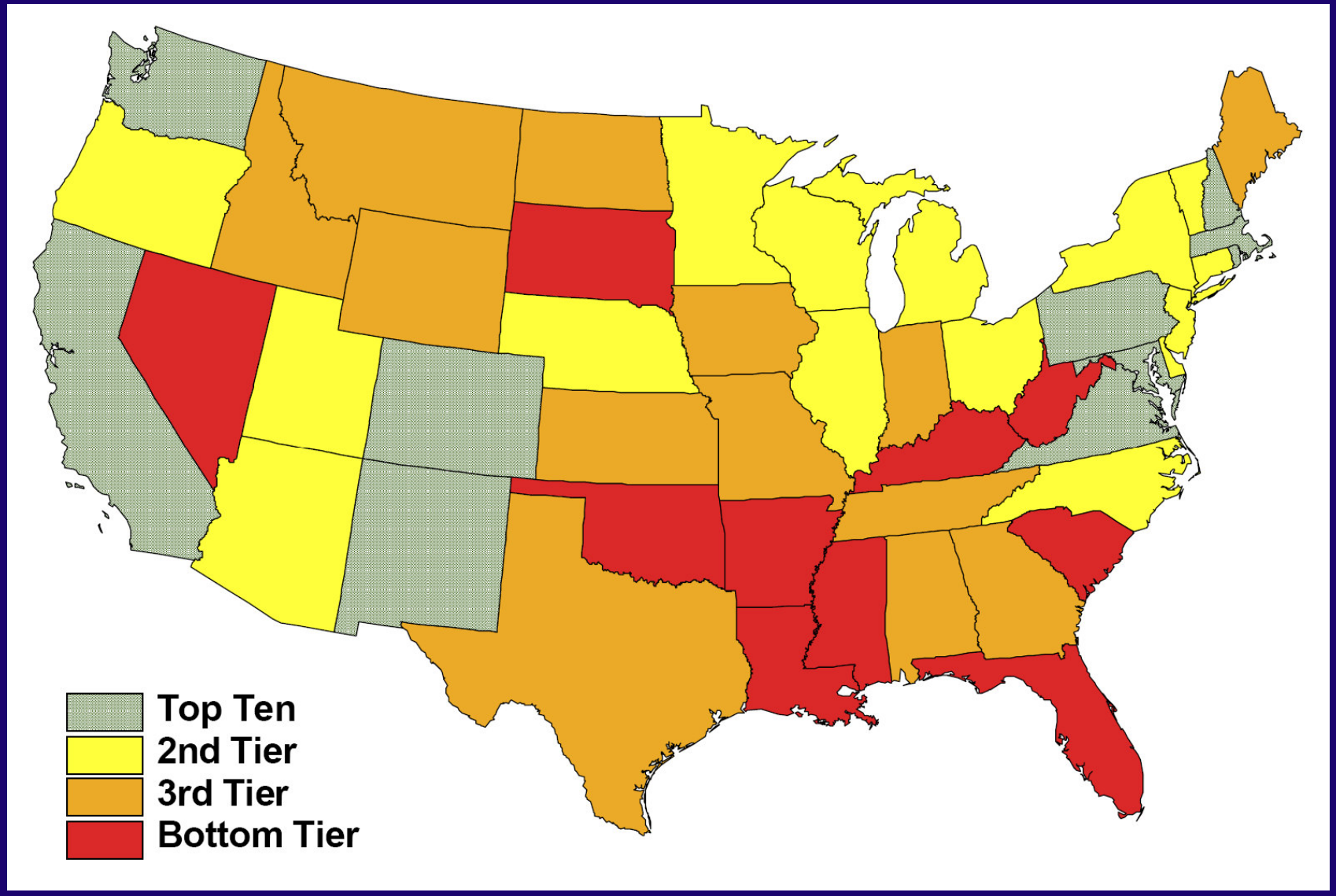
Milken Institute 2004

Human capital & investments



Milken Institute 2004

R&D inputs



"The big winners in the increasingly fierce global scramble for supremacy will not be those who simply make commodities faster and cheaper than the competition. They will be those who develop talent, techniques, and tools so advanced that there is no competition. That means securing unquestioned superiority in nanotechnology, biotechnology, and information science and engineering."

Sustaining the Nation's Innovation Ecosystems, Information Technology Manufacturing and Competitiveness, PCAST

Characteristics of an innovation leader

- ⇨Strong investment in basic R&D
- ⇨Large body of skilled scientists & engineers
- ⇨Flexible & skilled workforce
- ⇨Reliable utilities and other infrastructure
- ⇨Policies that encourage high-tech companies to stay at home
- ⇨Competitive investment and tax environment
- ⇨Level international playing field through enforcement of trade agreements and IP rights

Sustaining the Nation's Innovation Ecosystems, Information Technology Manufacturing and Competitiveness, PCAST

Best practices…

in attracting and maintaining high-tech manufacturing capabilities

- ⇨Strong support for university R&D
- ⇨Skilled workforce
- ⇨Committed political leadership
- ⇨Alignment of public, private resources
- ⇨Plan for economic development
- ⇨Broad spectrum of incentives to realize the plan (such as tax policies)
- ⇨Pre-approved sites

Sustaining the Nation's Innovation Ecosystems, Information Technology Manufacturing and Competitiveness, PCAST

States that are successful in attracting and retaining high technology companies –

"They understand the underlying characteristics of the ecosystem… they devise a plan and relentlessly pursue it, providing a broad spectrum of incentives in order to achieve their goals."

Sustaining the Nation's Innovation Ecosystems, Information Technology Manufacturing and Competitiveness, PCAST

PCAST recommendations

Maximizing our advantages

- ⇨Strengthen R&D base
- ⇨Improve science and technology skills of the workforce
- ⇨Enhance entrepreneurial climate
- ⇨Rejuvenate underlying infrastructures

PCAST recommendations

Assessing the competition

- ⇨Make R&D tax cut permanent
- ⇨Assess foreign tax programs and their impact on investment practices
- ⇨Pursue and expedited WTO process to resolve IP and market access violations

Atlanta's assets

- ⇨180,119 students enrolled in colleges (7th)
- ⇨26,681 graduates with at least a bachelor's degree each year
- ⇨National ranking in degrees awarded:
  - →2nd in engineering
  - →5th in computer/info science and math
  - →6th in health professions and business
  - →7th in physical sciences, biological/life sciences and health professions
  - →8th in architecture and communications

Role of universities in economic development

- Basic research: over 70% of industry patents cite federally funded research conducted largely at universities
- Educating the workforce
- Ongoing professional education
- Technology transfer (Bayh-Dole Act)

Components of tech transfer

- ⇨ Federal Investment
- ⇨ Research & Development
- ⇨ Intellectual Property
- ⇨ Licensing to industry

Addressed by federal legislation

- ⇨ Prototype
- ⇨ Marketable product
- ⇨ Commercialization
- ⇨ Economic Development

Involve many factors beyond the quality of the intellectual property: effective management, venture capital, marketing strategy

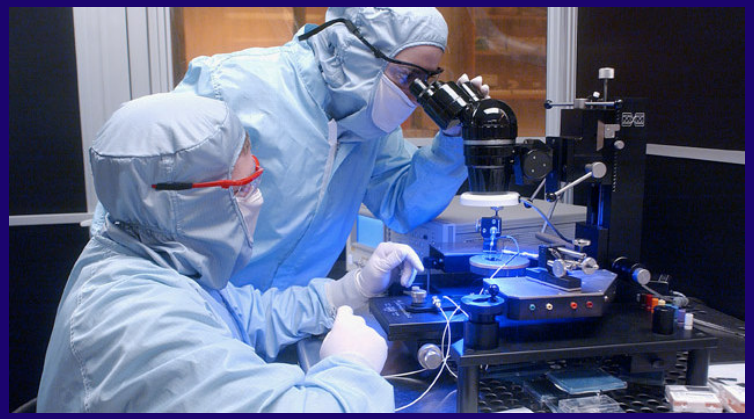
Taking it to the next level

- ⇨ Advanced Technology Development Center (Technology-led Excellence in Economic Development Award winner)
- ⇨ Economic Development Institute
- ⇨ VentureLab
- ⇨ Institute for Enterprise Transformation
- ⇨ Aligning university strengths, resources and objectives with state and community efforts

A model of state-level collaboration

- Partners:
  - → 6 Georgia research universities
  - → Private industry
  - → State government
- Focus on:
  - → Biotechnology
  - → Environmental science and technology
  - → Telecommunications
- Funds:
  - → Endowed chairs
  - → Lab facilities/equipment
  - → Research projects
  - → Industry studies

National LambdaRail infrastructure



National nanotech network

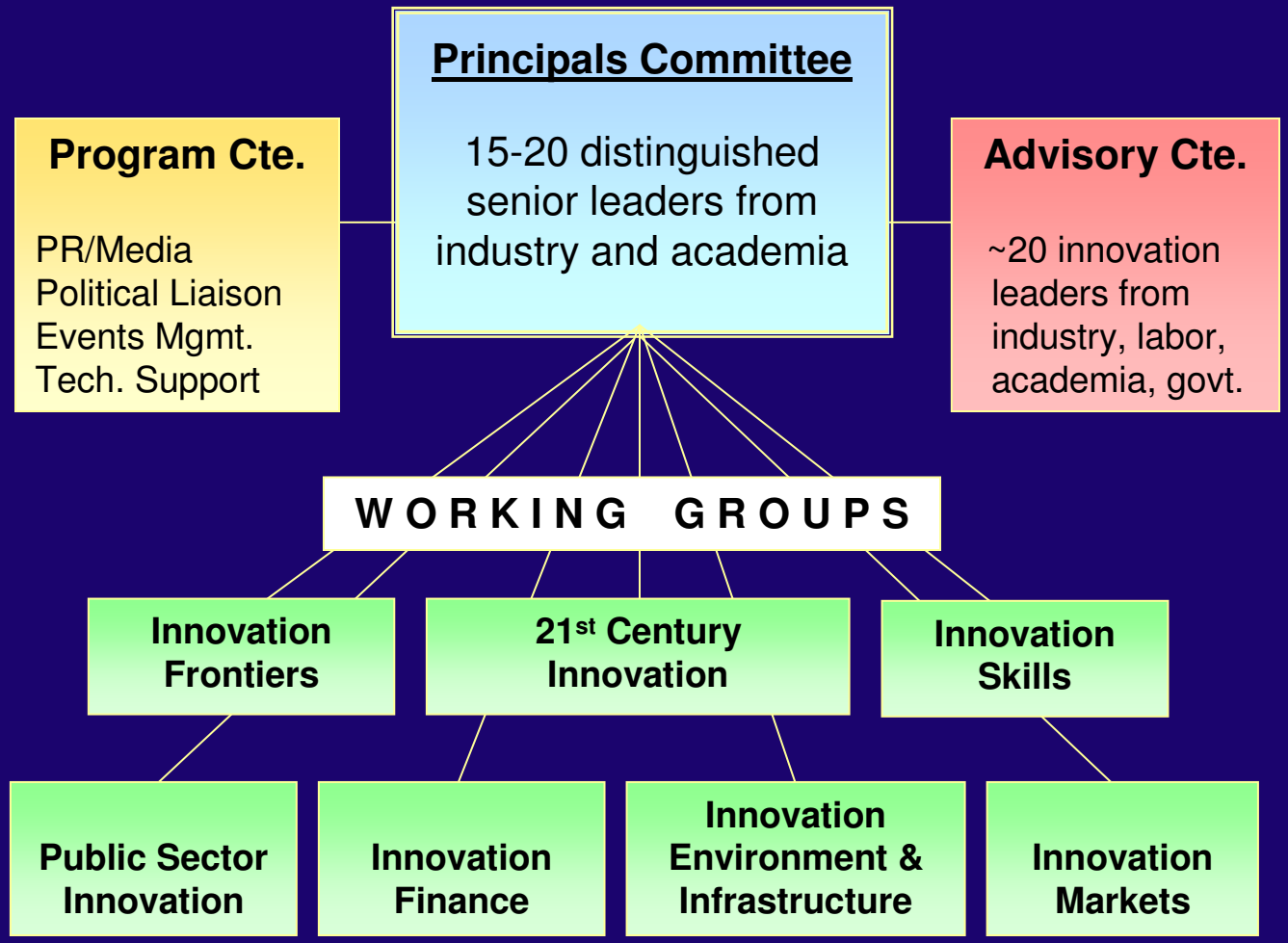
- 13 universities formed the National Nanotechnology Infrastructure Network, sponsored by NSF
- Provides access for scientists from universities, corporations, and government labs to specialized university resources for studying atomic and molecular-scale materials and processes

Council on Competitiveness

National Innovation Initiative

- ⇨Brings together America's top minds in seven working groups now underway
- ⇨Groups will define the factors and conditions that create a fertile environment for innovation
- ⇨Develop an agenda for national action to create that environment
- ⇨National innovation summit in Dec '04

National Innovation Initiative



Council on Competitiveness